

UNITED STATES DISTRICT COURT  
MIDDLE DISTRICT: PENNSYLVANIA

-----X  
MEGAPHASE, LLC,

Plaintiff,

v.

SELECTIVE INSURANCE COMPANY OF  
AMERICA, CHUBB NATIONAL INSURANCE  
COMPANY, a/k/a CHUBB GROUP OF  
INSURANCE COMPANIES, AND THE FEDERAL  
INSURANCE COMPANY,

Defendants.  
-----X

Docket No. 10-228

**COMPLAINT**

**PLAINTIFF DEMANDS TRIAL  
BY JURY**

**FILED  
SCRANTON**

**JAN 28 2010**

PER 

**DEPUTY CLERK**

The Plaintiff complains of the Defendants by its attorneys,  
The Dweck Law Firm, LLP and respectfully alleges to this Court as  
follows:

**COUNT I**

**INTRODUCTION**

1. This action is brought against the Defendant insurance companies who failed and refused to both defend and indemnify the Plaintiff, which was their insured under contracts of insurance, which provided Commercial General Liability Coverage, and Commercial Umbrella Coverage. MegaPhase, LLC ("MegaPhase") was named as a Defendant in an action brought against it by Flexco Microwave, Inc. ("Flexco"), in the United States District Court, for the District of New Jersey, bearing Docket No. 04-Civ-1339. Due to the intentional failure and refusal of the Defendants to defend and indemnify the Plaintiff in the above described action, and after timely notice was given to the Defendants of said

action and the requests to defend and indemnify, the Plaintiff was compelled to engage the services of attorneys directly, in order to protect its business, its customers and its staff, from losses, damages and insolvency. In this action, the Plaintiff seeks a judgment for the recovery and reimbursement to it, for all monies paid by, or on behalf of, the Plaintiff, for the costs of settlement, attorneys fees, and all other damages suffered and sustained by it, had the Defendants undertaken to defend and indemnify the and paid the monies as required by the insurance contracts. This includes, without limitation, monies paid to Flexco, for attorneys fees and any and all related charges, claims and expenses including reimbursement of attorneys fees for the prosecution of this action.

#### **THE PARTIES**

2. At all times hereinafter mentioned, the Plaintiff MegaPhase was and still is a limited liability company organized and existing under the laws, and is a citizen, of the Commonwealth of Pennsylvania, with its principal offices located at 2098 West Main Street, Stroudsburg, Pennsylvania.

3. Upon information and belief, the Defendant Selective Insurance Company of America ("Selective") is a corporation organized and existing under the laws, of the State of New Jersey and is a citizen of New Jersey with its principal offices located at 40 Wantage Avenue, Branchville, New Jersey

4. Upon information and belief, the Defendant Chubb National Insurance Company, a/k/a Chubb Group of Insurance Companies ("Chubb Group") is a group of corporations organized and existing under the laws, of the State of Indiana and a citizen of Indiana with its principal offices located at 15 Mountain View Road, Warren, New Jersey.

5. Upon information and belief, the Defendant Federal Insurance Company ("Federal") is a corporation organized and existing under the laws of the State of Indiana and is a citizen of Indiana with its principal offices located at 15 Mountain View Road, Warren, New Jersey.

6. Upon information and belief, and at all times hereinafter mentioned, and at all relevant times, each of the Defendants were authorized by the States of New Jersey and Pennsylvania to conduct and engage in the business of insurance including the underwriting of liability, indemnity and general insurance contracts.

**JURISDICTION AND VENUE**

7. This Court has jurisdiction pursuant to 28 USC § 1331 and 1332(a) because this is a civil action, and the Plaintiff sues the Defendants based upon contracts of insurance which were to be performed, and with respect to damages sustained by the Plaintiff, within the Commonwealth of Pennsylvania, and the amount in controversy exceeds \$75,000.00 exclusive of interest

and costs. Venue is proper in this District pursuant to 28 USC §§ 1391(a) and (b).

8. The Court has jurisdiction over the Defendants since they regularly transact business, failed to perform their contractual obligations and violated the law of the Commonwealth of Pennsylvania.

**THE NATURE OF THE CASE**

9. MegaPhase is engaged in the design and manufacture of cable at its facility in Stroudsburg, Pennsylvania. Its products are marketed for commercial users and sold both domestically and internationally.

10. In 2004, an action was commenced against the Plaintiff by Flexco Microwave, Inc., in the United States District Court, District of New Jersey (the "Flexco Action"), bearing Docket No. 04-Civ-1339 which alleged multiple causes of action against the Plaintiff, and its then principals William Pote and David Lutkins, for alleged patent infringement, unfair competition and other similar claims, seeking recovery of damages from the Plaintiff and its principals on each cause of action, along with injunctive relief, with attorneys fees and prejudgment interest and costs. A copy of the Complaint in the Flexco Action is annexed as Exhibit 1.

11. Prior to the commencement of said action, the Defendant Insurance Companies had issued policies and contracts of liability insurance and umbrella coverage for the period October

1, 1998 to and including October 1, 2004, for which the Plaintiff paid its premiums in full, which in the aggregate extended to tens of thousands of dollars.

12. The policies of insurance issued by the Defendants as aforescribed, encompassed the dates of coverages for the Plaintiff as follows:

1. October 1, 1998 to October 1, 1999 Selective Insurance Company;
2. October 1, 1999 to October 1, 2000 Chubb Group - Federal Insurance Company;
3. October 1, 2000 to October 1, 2001 Chubb Group - Federal Insurance Company;
4. October 1, 2001 to October 1, 2002 Chubb Group - Federal Insurance Company;
5. October 1, 2002 to October 1, 2003 Chubb Group - Federal Insurance Company;
6. October 1, 2003 to October 1, 2004 Chubb Group - Federal Insurance Company;

13. Pursuant to the terms of said insurance policies as aforescribed, the Defendant Insurance Companies insured and indemnified the Plaintiff as an "Insured" for all sums that the insured became legally obligated to pay as damages because of "Advertising Injury" to which the insurance applied. In addition, the Defendant Insurance Companies had the obligation and duty to defend the Plaintiff as their "Insured" against any suit seeking damages, even if the allegations of the suit were groundless, false or fraudulent.

14. The insurance applied to all "Advertising Injury" caused by an offense arising from the business of the insured, and separately from any personal activity of the Plaintiff and included therein, within the definition of "Advertising Injury", was an injury other than bodily injury or property damage sustained within the coverage territory during the respective policy periods.

15. Within said policies of insurance, as aforescribed, the word "Insured" included employees for acts within the scope of their employment by the insured, or while performing duties relating to the conduct of the business of the insured.

16. The insurance policies written by the Defendants which were issued to the Plaintiff, were in full force and effect on and between 1998 and 2004, when the acts attributed to the Plaintiff allegedly took place.

17. Upon information and belief, and upon receipt of the Summons and Complaint in the underlying "Flexco Action", in which Plaintiff and its principals are named as Defendants, which was the first notice to the Plaintiff of the claims set forth therein, copies of the Summons and Complaint were delivered to the Defendant Insurance Companies, with the appropriate request that the Defendant Insurance Companies provide to the Plaintiff, the defense, indemnity and representation in said Flexco Action on behalf and for the Plaintiff and its principals and employees

William Pote and David Lutkins, in accordance with the provisions of the Insurance Policies as heretofore alleged.

18. Thereafter, and following receipt of the Summons and Complaint by MegaPhase in the Flexco Action and the request to the Defendant Selective to defend and indemnify the Plaintiff, said Defendant by written confirmation dated May 21, 2004 agreed to defend that action in accordance with the terms and conditions of the insurance contract between the Plaintiff and it is assigned attorneys to appear for and defend the Plaintiff.

19. Upon receipt of the confirmation from the Defendant Selective that the defense of the action against the Plaintiff would be undertaken by counsel designated by it, the Plaintiff requested information from Selective with respect to the background of the designated attorneys, and their qualifications and familiarity with the defense of a patent infringement and intellectual property action, with associated claims of unfair competition, breach of loyalty and similarly related causes of action.

20. Thereafter and on or about June 16, 2004, the Defendant Selective attempted to decline coverage, defense and indemnity to the Plaintiff, despite its previous commitment to do, so without any reservation of rights.

21. On or about July 7, 2004, despite having been placed on notice of its contractual obligations to defend and indemnify the Plaintiff in the Flexco Action, and its undertaking to do so, the

Defendant Selective, without a basis in law or in fact, willfully, intentionally and in bad faith disclaimed coverage for the Plaintiff for any defense or indemnity to it in the Flexco Action.

22. On or about the same dates, the Plaintiff also requested that the Defendants Chubb Group and Federal defend and indemnify the Plaintiff in accordance with the terms of the several policies issued by them to the Plaintiff.

23. The Defendants, the Chubb Companies responded that they understood that Selective Insurance Company was to provide the primary defense for the Plaintiff, and that they would defer in such instance with respect to the defense of the Flexco Action.

24. The Defendants Chubb Group and Federal never defended or indemnified the Plaintiff.

25. The Defendant Insurance Companies have failed and refused to defend for the action in chief as against the Plaintiff William Pote and David Lutkins, its principals and employees.

26. Upon information and belief, the basis for the denial by the Defendant Insurance Companies in their refusal to defend and indemnify the Plaintiff and its principals is that the Complaint in chief alleges that the conduct of the Plaintiff and its principals and employees was intentional and wilfull. The Plaintiff and its principal-employees, have absolutely denied having engaged in any such conduct.



27. After the failure and refusal of the Defendants to undertake to defend and indemnify the Plaintiff, and its principals and employees in the Flexco Action, the Plaintiff was compelled to defend the Flexco Action against it, and to pay monies in settlement of that lawsuit, said damages and the cost of the defense of said action against the Plaintiff herein are attributable to the Defendant Insurance Companies for all expenditures for the defense and settlement of said action.

28. By virtue of all of the foregoing and the failure and refusal by the Defendants to defend and indemnify the Plaintiff, the Defendants are guilty of having breached their respective contracts with the Plaintiff and have caused the Plaintiff to sustain damages in a sum to be determined upon a trial of this action, but believed to be in a sum of not less than \$750,000.00 together with the sums expended for attorneys fees and disbursements, in the defense of the Flexco Action, as well as attorneys fees and disbursements for the prosecution of this action, for which the Plaintiff seeks judgment against each of the Defendants for their respective obligations together with the costs and disbursements of this action.

**COUNT II**

29. Plaintiff repeats and realleges each and every allegation contained in paragraphs of the complaint numbered "1" through "28", inclusive, as though more fully set forth at length herein.

30. In addition to the foregoing bad faith refusal by the Defendants to fulfill their contractual obligations as aforescribed, the Defendants have been capricious and arbitrary in their conduct, and have intentionally evaded, breached and failed to honor their contractual obligations by having initially, and then repeatedly, refused to honor their obligations to the Plaintiff to defend and indemnify it against the claims asserted against it in the Flexco Action.

31. The denial of coverage and refusal to defend and indemnify the Plaintiff was in bad faith and in violation of the law of the Commonwealth of Pennsylvania, as well as the contracts with the Plaintiff.

32. The Plaintiff seeks recovery of an award of interest on the amount recovered by it upon the trial of this action equal to the prime rate of interest plus three percent, together with an award of punitive damages, court costs and attorneys fees pursuant to 42 Pa C.S.A.

WHEREFORE, Plaintiff demands judgment as follows:

1. On Count I for judgment against each Defendant in the amount of all damages sustained by the Plaintiff, as a result of the failure of each of the Defendants to defend and indemnify the Plaintiff, in sums equal to the attorneys fees expended by the Plaintiff in the defense of the Flexco Action, as well as the amounts paid, and to be paid by the Plaintiff in settlement of the Flexco Action;

2. On Count 2 for a determination that the Defendants have acted in bad faith toward the Plaintiff as their insured, and an award of the damages sustained by the Plaintiff as a result of the failure of each of the Defendants to defend and indemnify the Plaintiff, in sums equal to the attorneys fees expended by the Plaintiff in the defense of the Flexco Action, as well as the amounts paid, and to be paid, by the Plaintiff in settlement of the Flexco Action, together with an award of interest on the amount of Plaintiff's damages with equal to the prime rate plus three percent, plus an award of punitive damages against each Defendant, and an award of costs and attorneys fees all pursuant to 42 Pa C.S.A. § 8371.

Dated: New York, New York  
January 26, 2010

THE DWECK LAW FIRM, LLP  
Attorneys for Plaintiff

By: 

H.P. Sean Dweck  
75 Rockefeller Plaza, 16<sup>th</sup> Floor  
New York, New York 10019  
(212) 687-8200

CERTIFICATION PURSUANT TO LOCAL CIVIL RULE 201.1(d)(1)

Pursuant to Local Civil Rule 201.1(d)(1), we hereby certify that the within damages are in excess of \$150,000, exclusive of interest and costs and any claim for punitive damages.

Executed on January 26, 2010

THE DWECK LAW FIRM, LLP  
Attorneys for Plaintiff  
MegaPhase, LLC

By: \_\_\_\_\_

  
H. P. Sean Dweck

CERTIFICATION PURSUANT TO LOCAL CIVIL RULE 11.2

Pursuant to Local Civil Rule 11.2, I hereby certify that the within action is not the subject of any other action pending in any Court, or of any pending arbitration or administrative proceeding

Executed on January 26, 2010

THE DWECK LAW FIRM, LLP  
Attorneys for Plaintiff  
MegaPhase, LLC

By: 

H. P. Sean Dweck



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WILLIAM T. WALSH, CLERK

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AT 8:30 M  
WILLIAM T. WALSH  
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UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF NEW JERSEY

FLEXCO MICROWAVE, INC.

Plaintiff,

v.

MEGAPHASE LLC, WILLIAM POTE,  
III, DAVID LUTKINS, and  
JOHN DOES I-VII,

Defendants.

Civil Action No. 04-1339(mlc)

COMPLAINT

Plaintiff Flexco Microwave, Inc., a New Jersey corporation with its principal place of business at 101 E. Bilby Road, Suite E, Hackettstown, New Jersey ("Flexco"), by way of Complaint against Defendants MegaPhase LLC, a Pennsylvania limited liability company, with its principal place of business at 201-D North 1<sup>st</sup> Street, Stroudsburg, Pennsylvania 18360 ("MegaPhase"), William Pote, III ("Pote III"), an individual residing at 22 Vassar Road, Great Meadows, New Jersey, David Lutkins ("Lutkins"), an individual residing at

RR 4, Box 37LE, Saylorsburg, PA 18353 (collectively, Pote III and Lutkins are referred to herein as the "Individual Defendants"), and John Does I-VII (collectively, MegaPhase, the Individual Defendants and John Does I-VII are referred to herein as "Defendants"), says:

**NATURE OF THE ACTION**

1. This is an action for patent infringement pursuant to 35 U.S.C. §§ 271 and 281, et seq., arising out of Defendants' willful and deliberate infringement of the patent described herein, and for violations of New Jersey law of unfair competition and contracts based upon Defendants misappropriation of Flexco's trade secrets and confidential business information.

2. The patent was issued to Thomas Pote, Roger Johansen and William T. Pote of Flexco. The patent was thereafter assigned by them to Flexco. The patent describes a particular method of making flexible coaxial cables. (The patent is referred to herein as the "Flexco Patent.")

3. Flexco seeks monetary damages as well as injunctive relief to halt Defendants' continuing infringement of the Flexco Patent as well as Defendants' continuing recruitment of Defendants' distributors, Defendants' unfair competition, and Defendants' appropriation and use of



Flexco's confidential information, trade secrets and proprietary business information. Injunctive relief is necessary to prevent irreparable injury to Flexco that cannot be fully and adequately redressed by an award of monetary damages.

4. Defendants, all former Flexco employees and the competing company that they founded, have willfully and deliberately infringed the Flexco Patent by, among other things, starting and operating a business making products using Flexco's Patent, and otherwise acting in a manner designed to induce infringement of the Flexco Patent.

#### JURISDICTION AND VENUE

5. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a) because this is a civil action for patent infringement arising under the Patent Laws of the United States, Title 35, United States Code. This Court also has original jurisdiction over the state unfair competition claims pursuant to 28 U.S.C. § 1338(b) and supplemental jurisdiction over the state common law claims pursuant to 28 U.S.C. § 1367(a).

6. Venue is proper in this District pursuant to 28 U.S.C. § 1400(b), and 28 U.S.C. § 1391(b).

**PARTIES**

**Plaintiff**

7. Flexco is a New Jersey corporation, with its principal place of business at 101 E. Bilby Road, Suite E, Hackettstown, New Jersey.

8. Since the 1970s, Flexco has continuously engaged in the design and manufacture and sale of coaxial cable using the Flexco Patent and other patented or proprietary and trade secret processes and production methods. Flexco has pioneered the manufacture of flexible coaxial cable that maintains its electrical stability under repeated flexure, a major advance in coaxial products. Flexco's products are manufactured and marketed for military, aerospace and commercial markets.

9. Flexco markets its products throughout the United States, Europe and Asia using an internal sales group and external distributors.

10. William T. Pote is Flexco's president and is known in the trade in connection with Flexco's business as "Bill Pote."

**Defendants**

11. Upon information and belief, Defendant MegaPhase is a Pennsylvania limited liability company, with

its principal place of business located at 201-D North 1<sup>st</sup> Street, Stroudsburg, Pennsylvania.

12. Defendant Pote III, is a citizen of the State of New Jersey, residing at 22 Vassar Road, Great Meadows, New Jersey 07838.

13. Pote III is William T. Pote's son. He is also MegaPhase's president and one of its founders. Pote III also uses and has used the name "Bill Pote" in connection with his current activities at MegaPhase.

14. Pote III was employed by Flexco until on or about August 21, 1998 when he resigned ostensibly to embark on a new career as a financial planner or consultant. His positions with Flexco had included director, treasurer and vice president in charge of sales and marketing, among other positions.

15. Defendant Lutkins is a citizen of the State of Pennsylvania, residing at RR 4, Box 37LE, Saylorsburg, PA 18353.

16. Lutkins was employed by Flexco until he resigned in or about late 1998 to take a position with MegaPhase. His positions at Flexco included staff engineer and quality control manager.

17. Defendants John Does I-VII are associates of the Individual Defendants and are involved with them in the wrongful acts herein described that have resulted in irreparable harm and damages to Flexco.

#### **FACTUAL BACKGROUND**

##### **THE FLEXCO PATENT**

18. The Flexco Patent was duly and legally issued on January 26, 1993 as United States Patent No. 5,181,316, entitled "Method for Making Flexible Coaxial Cable." A copy of the Flexco Patent is annexed hereto as Exhibit A.

19. The Flexco Patent describes and claims an improved method of making a flexible coaxial cable using a locking machine.

20. Flexco provided notice to manufacturers, sellers and/or distributors of coaxial cable both in the United States and abroad, explicitly informing the recipients, among other things, that the Flexco Patent had been issued and assigned to Flexco.

##### **Flexco's Business**

21. Flexco has developed and utilizes many manufacturing designs, procedures, processes, methods and machines that have enabled it to realize a competitive advantage in the marketplace of coaxial products. Such manufac-

turing designs, procedures, methods, processes and machines constitute valuable trade secrets that are Flexco's property. The following are included, without limitation, among the manufacturing designs, procedures, processes, methods and machines that are trade secrets of Flexco:

- (a) the convoluted outer conductor for various size cables and cable designs;
- (b) the convoluted outer conductor cutting machine;
- (c) the cutting of the outer conductor in preparation for connectorizing;
- (d) the materials, shapes and sizes of the dielectric;
- (e) skiving the dielectric for optimum size for insertion;
- (f) the materials, construction and sizes of the center conductor;
- (g) the core insertion into the outer conductor;
- (h) the type, size and process for covering the outer conductor with braid;
- (i) attaching braid to connector adapter;

- (j) the type, sizes and process of jacketing the cable including selection of the optimum sizes;
- (k) applying the strain reliefs;
- (l) attaching the cable to the connectors;
- (m) electrically testing the cable assemblies;
- (n) packaging the assemblies for shipping;
- (o) connector designs, connector cable adapters and pin adapters.

22. Because Flexco sells coaxial cable for specialized purposes, Flexco maintains a sales force which possesses extensive knowledge of the requirements and needs peculiar to the operation of each of its customers. Consequently, Flexco has acquired a unique and systematic knowledge of its customers' identities, operations, and particular needs for Flexco's products. This highly confidential business information relates to both the volume and specific kinds of Flexco products used by its customers, and includes specially prepared customer activity reports showing, among other things, the products which they have purchased previously, the unit price of each product purchased, the dollar amount of products sold to the customer in the previous year, the dollar amount of products sold to the customer to

date in the current year, and other confidential information, collectively referred to herein as "activity reports."

23. In addition to the activity reports that are distributed to all sales and management personnel, each salesperson possesses a coded price book, various customer files, including customer cards which contain the names and addresses of customers, the names of the people to contact, the frequency with which to make calls, the type and amount of products purchased, and other confidential customer information, referred to herein as "customer records."

24. The loss of such trade secrets and confidential business information, or their utilization by Defendants or others, would result in irreparable harm to Flexco, for which Flexco has no adequate remedy at law.

25. Flexco acquaints its employees with its customers and their operations, special needs, and requirements. Because each employee must be so trained, the employees' continued employment is of great and unique value to Flexco.

26. By reason of their employment and training, Flexco's employees are placed in a favored position of special confidence and trust whereby they are given access to Flexco's previously acquired and highly secret and confi-

dential knowledge of its customers, their locations, buying habits, and specific requirements. Flexco's employees are thereby given the opportunity to make personal contact with and gain specialized knowledge of Flexco's customers.

27. Flexco, since at least 1992, has distributed to employees its Employee Handbook containing Flexco's company policies.

28. The Flexco Employee Handbook requires, in Sections 1.27, 1.29, 1.34 and 3.2, that employees keep Flexco's confidential and proprietary information confidential, and prohibits employees from disclosing any of Flexco's confidential information to anyone. Removal of Flexco's property and working for, or releasing confidential information to, a competitor is strictly prohibited.

29. Each of the Individual Defendants executed a form acknowledging that they received the Employee Handbook.

30. Flexco, since at least 1986, has required that certain employees execute an Employee Agreement Regarding Intellectual Property in which each employee agrees to:

- (a) assign to Flexco all of his rights to all intellectual property developed by Defendant during his employment with Flexco;



- (b) keep in confidence all of Flexco's proprietary information acquired during his employment with Flexco; and to keep such information in confidence both during and after his employment with Flexco; and
- (c) not use any of Flexco's proprietary information during and after his employment with Flexco.

31. Each of the Individual Defendants executed the Employee Agreement regarding Intellectual Property in connection with his employment by Flexco.

32. Flexco acquaints its outside distributors with product samples and information regarding its products. Because each distributor is so trained, Flexco's continued contractual relationship with its distributors is of great and unique value to Flexco.

33. Flexco has expended considerable time, effort and money cultivating its distributor and employee relationships and reasonably expected that such relationships would generate substantial income for Flexco on an ongoing basis.

Individual Defendants' Employment at Flexco

34. On or about September 10, 1990, after completing his college education financed by his father, Wil-

liam T. Pote, Pote III became employed by Flexco as an assistant accountant.

35. On or about September 10, 1990 Pote III executed Flexco's Employee Agreement Regarding Intellectual Property.

36. As the son of Flexco's president, Pote III rose through the ranks of Flexco, serving as a director, treasurer and vice president in charge of sales and marketing, among other positions. The duties of Pote III in those positions included the hiring of employees, the purchase of materials, marketing and supervising the production of Flexco's products.

37. Pote III's duties while employed by Flexco caused him to have access to the Flexco Patent and to all of the trade secret and confidential information, data and material that were essential not only to the sale of Flexco's products but of all aspects of Flexco's operations. This trade secret and confidential information included, among other things, the names and locations of present and potential customers and distributors, the detailed operations of the customers, their special requirements, their buying habits including the type and amount of products used

by them, the information contained in the activity reports and customer records.

38. The remaining Individual Defendant, who at all times during his employment by Flexco stood in a relationship of trust and confidence with Flexco, became, by reason of his employment, intimately acquainted with all the trade secret and confidential manufacturing processes, methods, procedures, machinery, equipment, and paraphernalia utilized in the manufacture of Flexco's coaxial cable and the Flexco Patent, and knew that such information imparted to him during his employment with Flexco was trade secret and confidential.

**Defendants' Scheme**

39. Some time in late 1998, the Individual Defendants began to develop a scheme whereby they would start a business virtually identical to Flexco making products using the Flexco Patent, trade secrets and confidential information, hiring key Flexco employees away from Flexco, engaging Flexco's distributors, and passing Pote III off as his father, "Bill Pote."

40. Flexco now believes that Defendants, with the intent to damage the business of Flexco, have conspired to use the Flexco Patent and engage in the business of produc-

ing coaxial cable substantially similar to and competitive with those produced by Flexco. At the same time, the Individual Defendants, began to make plans by which they would obtain, and use in their new business, Flexco's trade secrets and the Flexco Patent. The Individual Defendants also began to lay the groundwork for a campaign to induce other Flexco employees, including without limitation, a production manager, engineer, quality control manager, purchasing agent, assembly technician, and outer conductor builder, and persons involved in the sales process, to quit the employ of Flexco and to sell the competitive products which Defendants intended to produce and sell.

41. In furtherance of the scheme, Pote III and the other Individual Defendants have caused MegaPhase to manufacture and market products competitive to Flexco's, using the Flexco Patent, Flexco's trade secrets and other confidential business information belonging to Flexco.

42. As part of the scheme, Defendants enticed various key employees to leave their employment with Flexco, commence employment with MegaPhase and breach their duties of loyalty and other obligations which they owed to Flexco. The Individual Defendants performed certain of the acts

described herein secretly while they were still employed by Flexco.

43. Defendants also interfered with Flexco's relationship with its distributors and enticed Flexco distributors to terminate their contractual relationships with Flexco and enter new distributor relationships with MegaPhase.

44. As a direct and proximate result of the acts of Defendants, many of Flexco's distributors terminated their contractual relationship with Flexco and began selling MegaPhase products.

45. Defendants have also interfered with Flexco's relationship with its customers and lured Flexco customers away from Flexco.

46. Flexco is informed and believes and, based on such information and belief, alleges that the activities of Pote III at MegaPhase have resulted in the wrongful disclosure and utilization of Plaintiff's trade secrets.

47. Defendants know that Flexco's manufacturing processes, assembly, machines, connector designs, cable designs, methods and procedures were and are Flexco's trade secrets.

48. Defendants have conspired to obtain and have obtained from Flexco's personnel, former sales personnel, and technical personnel, copies of Flexco's highly confidential activity reports, customer records, product designs, machine designs and sources of supply. Defendants are using these trade secrets in producing and marketing MegaPhase's products to Flexco's customers.

49. Defendants encouraged and induced some of their sales employees, formerly employed by Flexco, to sell MegaPhase's products to Flexco's customers, whose identity, location and special needs and requirements became known to these sales personnel by virtue of their employment with Flexco.

50. By thus inducing former sales employees of Flexco to sell MegaPhase's products to the customers of Flexco, and by retaining and using the activity reports, customer records, and product information of Flexco, Defendants have appropriated to themselves the benefit of the business and goodwill which Flexco has established with its customers.

51. Defendants have wrongfully appropriated and used for their benefit the Flexco Patent and Flexco's confidential information and trade secrets, including those

relating to Flexco's production of coaxial cable without Flexco's consent, and in violation of Flexco's rights.

52. Defendants used, and are using, Flexco's confidential activity reports, customer reports and product design information which became known to the Individual Defendants and other persons now employed by MegaPhase by virtue of their previous employment with Flexco.

53. As a direct and proximate result of Defendants' acts, Flexco has suffered damages.

54. Flexco's competitive advantage in the development, manufacture, and marketing of its products, including coaxial cable, will be seriously harmed and it will therefore suffer great and irreparable injury without having an adequate remedy at law, unless the unlawful violation by Defendants of Flexco's rights in the above-described Flexco Patent, and trade secret and confidential business information is enjoined.

55. The aforesaid actions of Defendants were done without justifiable cause, with malicious intent to injure Flexco's business, and in wilful and wanton disregard for the rights of Flexco.

FIRST COUNT  
Patent Infringement

56. Flexco repeats and realleges each allegation contained in Paragraphs 1 through 55 as if set forth fully herein.

57. Defendants have infringed and are now infringing the Flexco Patent by making, using, and selling within the United States and elsewhere products embodying the inventions claimed therein and will continue to do so unless enjoined by this Court.

58. Defendants' infringement of the Flexco Patent is willful and deliberate, notice of the existence of the Flexco Patent having been duly placed on Flexco's products and the Individual Defendants having been made aware of the existence of the Flexco Patent in the course of their employment with Flexco.

59. Defendants' infringement of the Flexco Patent has deprived Flexco of sales of its products which it otherwise would have made, and has in all other respects injured Flexco and will cause Flexco added injury and loss of profits unless enjoined by this Court.



**SECOND COUNT**  
**Trade Secrets**

60. Flexco repeats and realleges each allegation contained in Paragraphs 1 through 59 as if set forth fully herein.

61. MegaPhase has engaged, and is presently engaged, in furtherance of a plan or scheme to induce the wrongful disclosure to it of Flexco's trade secrets and to wrongfully utilize and/or disseminate such trade secrets to its advantage and to the detriment of Flexco.

62. Defendants are disclosing to others, particularly employees of MegaPhase, Flexco's carefully guarded valuable trade secrets relating to the design and manufacture of Flexco's products, as well as Flexco's activity reports and customer records, and those actions are causing irreparable injury to Flexco unless enjoined by this Court.

**THIRD COUNT**  
**Distributors**

63. Flexco repeats and realleges each allegation contained in Paragraphs 1 through 62 as if fully set forth herein.

64. Defendants' wrongful acts constitute unfair competition and tortious interference with Flexco's contrac-

tual relationships with its distributors and economic advantage.

65. Unless Defendants are enjoined from inducing and attempting to induce Flexco's distributors from terminating their contractual relationship with Flexco, Defendants will continue to perform these acts of inducement and interference, at any time more of Flexco's distributors may be enticed to end their contractual relationships with Flexco, and Flexco will thereby suffer great and irreparable damage, for which Flexco has no adequate remedy at law.

**FOURTH COUNT**  
**Unfair Competition**

66. Flexco repeats and realleges each allegation contained in Paragraphs 1 through 65 as if fully set forth herein.

67. Defendants jointly and severally have unfairly competed with Flexco by copying well-known patented features of Flexco's products and by otherwise causing customer confusion; by using and disclosing trade secrets of Flexco; by using and disclosing skills and know-how taught to the Individual Defendants in confidence; and by wrongfully appropriating and making use of documents, papers, and copies and abstracts and summaries thereof, including draw-

ings that are Flexco's property, all of which practices already have resulted in serious injury to Flexco's business position, reputation, and good will, and will result in irreparable injury to Flexco unless enjoined by this Court.

**FIFTH COUNT**  
**Customers**

68. Flexco repeats and realleges each allegation contained in Paragraphs 1 through 67 as if fully set forth herein.

69. The foregoing actions of Defendants constitute unfair competition, tortious interference with Flexco's economic advantage, and misuse of trade secrets belonging to Flexco, to the significant detriment of Flexco, thereby causing Flexco to lose profits from sales and to lose business and customer goodwill, and is causing Flexco irreparable injury for which there is no adequate legal remedy.

**SIXTH COUNT**  
**Covenant of Loyalty**

70. Flexco repeats and realleges each allegation contained in Paragraphs 1 through 69 as if fully set forth herein.

71. By the foregoing actions, each of the Individual Defendants breached his covenant of loyalty to Flexco to the significant detriment of Flexco, Flexco having lost

profits from sales and having lost business and customer goodwill, and is causing Flexco irreparable injury for which there is no adequate legal remedy.

**SEVENTH COUNT**  
**Breach of Contract**

72. Flexco repeats and realleges each allegation contained in Paragraphs 1 through 71 as if fully set forth herein.

73. Each of the Individual Defendants has breached his respective agreements contained in the Flexco Employee Handbook by disclosing to MegaPhase and others certain, if not all of, the trade secrets, skills and other confidential information revealed and/or taught to him by Flexco during his employment.

74. Defendant MegaPhase induced and/or profited from the aforesaid breach of the Individual Defendants' agreement with Flexco.

75. Said breaches will continue, to the irreparable injury to Flexco, unless enjoined by this Court.

**EIGHT COUNT**  
**Breach of Contract**

76. Flexco repeats and realleges each allegation contained in Paragraphs 1 through 75 as if fully set forth herein.

77. Each of the Individual Defendants has breached his Employee Agreement Regarding Intellectual Property by disclosing to MegaPhase and others trade secrets, and confidential business information revealed and/or taught to him by Flexco during his employment.

78. Defendant MegaPhase induced and/or profited from the aforesaid breach of the Individual's agreement with Flexco.

79. Defendant MegaPhase induced and/or profited from the aforesaid breach of the Individual Defendants' agreement with Flexco.

80. Said breaches will continue, to the irreparable injury to Flexco, unless enjoined by this Court.

**NINTH COUNT**  
**Unjust Enrichment**

81. Flexco repeats and realleges each allegation contained in Paragraphs 1 through 80 as if fully set forth herein.

82. The foregoing actions of Defendants constitute unjust enrichment that has caused Flexco damages.

**WHEREFORE**, Flexco demands judgment against Defendants, jointly and severally, as follows:

(a) a preliminary and permanent injunction pursuant to 35 U.S.C. § 283 enjoining and restraining Defendants, their officers, agents, servants and employees, and all persons in active concert or participation with them, and each of them, from using and infringing the Flexco Patent;

(b) A preliminary and permanent injunction enjoining and restraining Defendants from utilizing in any manner whatsoever, or divulging to any other person, firm, corporation or entity, any of Flexco's trade secrets and confidential business information, as well as any of the materials, processes, procedures, and designs utilized by Flexco in the manufacture of coaxial cable and other Flexco Products which were known to the Individual Defendants during the course of their employment by Flexco;

(c) A preliminary and permanent injunction enjoining and restraining Defendants, their officers, agents, servants and employees, and all persons in active concert or participation with them, and each of them, from contacting or soliciting any customer or potential customer of Flexco whose identity was learned by the Individual Defendants in the course of their employment with Flexco or from customer information obtained by Flexco;

(d) A preliminary and permanent injunction enjoining and restraining Defendants, their officers, agents, servants and employees, and all persons in active concert or participation with them, and each of them, from recruiting or soliciting Flexco's distributors;

(e) A preliminary and permanent injunction enjoining and restraining Defendants, their officers, agents, servants and employees, and all persons in active concert or participation with them, and each of them, from using or disclosing Flexco's customer lists, records, statistics, prices, formulas, method of operations or any other information acquired by the Individual Defendants during the course of their relationship with Flexco;

(f) A preliminary and permanent injunction enjoining and restraining Defendants, their officers, agents, servants and employees, and all persons in active concert or participation with them, and each of them, from inducing or attempting to induce Flexco's employees to terminate their present employment with Flexco, to breach their contractual obligations to Flexco, and to sell Defendants' products to customers of Flexco, whose identity, location, special problems, and specific requirements became

known to these employees as a result of their employment with Flexco;

(g) A preliminary and permanent injunction enjoining and restraining each of the Individual Defendants from unfairly competing with Flexco, pursuant to the terms and conditions of his respective written Agreement with Flexco and the Flexco Employee Handbook;

(h) Requiring Defendants to account to Flexco for all monies received as a result of the acts complained of above;

(i) Awarding Flexco compensatory and consequential damages;

(j) Awarding Flexco treble damages pursuant to 35 U.S.C. § 284;

(k) Awarding Flexco damages together with interest and costs pursuant to 35 U.S.C. 284;

(l) Awarding Flexco attorneys' fees pursuant to 35 U.S.C. § 285;

(m) Awarding Flexco profits pursuant to 35 U.S.C. § 289;

(n) Awarding Flexco punitive damages;

(o) Awarding Flexco prejudgment interest and costs of suit; and



(p) Awarding Flexco such other and further relief as the Court deems equitable and just.

SKADDEN, ARPS, SLATE, MEAGHER  
& FLOM LLP  
Attorneys for Plaintiff  
Flexco Microwave, Inc.

By:   
ANDREW MUSCATO (AM 3025)

Dated: March 19, 2004

**CERTIFICATION PURSUANT TO LOCAL CIVIL RULE 11.2**

Pursuant to Local Civil Rule 11.2, I hereby certify that the within action is not the subject of any other action pending in any Court, or of any pending arbitration or administrative proceeding.

Executed on March 19, 2004

SKADDEN, ARPS, SLATE, MEAGHER  
& FLOM LLP  
Attorneys for Plaintiff  
Flexco Microwave, Inc.

By:   
ANDREW MUSCATO (AM 3025)

CERTIFICATION PURSUANT TO LOCAL CIVIL RULE 201.1(d)(1)

Pursuant to Local Civil Rule 201.1(d)(1), we hereby certify that the within damages are in excess of \$150,000, exclusive of interest and costs and any claim for punitive damages.

Executed on March 19, 2004

SKADDEN, ARPS, SLATE, MEAGHER  
& FLOM LLP  
Attorneys for Plaintiff  
Flexco Microwave, Inc.

By: 

ANDREW MUSCATO (AM 3025)

EXHIBIT  
A



US005181316A

**United States Patent** [19][11] Patent Number: **5,181,316**

Pote et al.

[45] Date of Patent: **Jan. 26, 1993**[54] **METHOD FOR MAKING FLEXIBLE COAXIAL CABLE**

600446 12/1959 Italy ..... 29/728

[75] Inventors: William Pote, Glen Gardner; Roger Johansen, South Plainfield; Thomas Pote, Gladstone, all of N.J.

Primary Examiner—Carl J. Arbes  
Attorney, Agent, or Firm—Bryan Cave

[73] Assignee: Flexco Microwave, Inc., Port Murray, N.Y.

[57] **ABSTRACT**

[21] Appl. No.: 749,194

[22] Filed: Aug. 23, 1991

[51] Int. Cl.<sup>5</sup> ..... H01B 13/10[52] U.S. Cl. .... 29/828; 29/728;  
156/54; 174/102 D; 174/106 D[58] Field of Search ..... 29/828; 138/144, 173,  
138/174; 174/106 D; 156/54[56] **References Cited****U.S. PATENT DOCUMENTS**

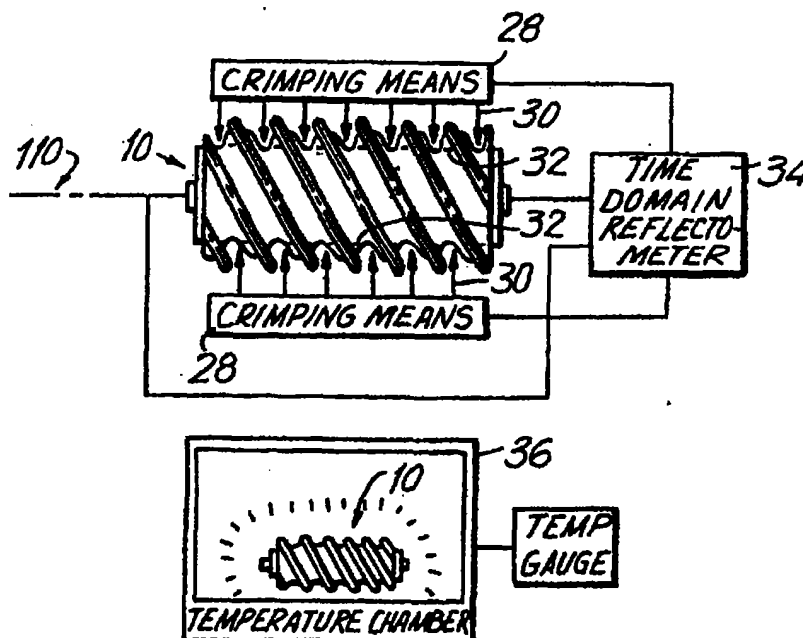
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**17 Claims, 5 Drawing Sheets**

An improved method of making a flexible coaxial cable (10) having a dielectric core (12) comprising an inner conductor (14) and a dielectric (16) surrounding the inner conductor (14), and a corrugated outer conductive sheath (18, 20) having a plurality of peaks (22) and valleys (24) of predetermined pitch, comprises the step of substantially simultaneously crimping solely the valleys (24) from at least three angularly spaced directions, such as three equiangularly spaced directions about the longitudinal axis (110) of the outer sheath (18, 20), by using angularly spaced crimping wheels (100, 102, 104) which float to follow the predetermined pitch of the corrugated sheath (18, 20) for embedding the valleys (24) in the dielectric (12, 16) so as to lock the dielectric (12, 16) to the sheath (18, 20) for providing electrical stability for the resultant coaxial cable (10). The depth of at least one of the crimping wheels (100) may be micrometer (108) adjusted with respect to the sheath longitudinal axis (110) for setting the depth of locking. The other crimping wheels (102, 104) may act as guides in conjunction with a guide slot (118) through which the sheath (18, 20) passes during crimping for controlling the degree of freedom of movement of the crimping wheels (100, 102, 104) and sheath (18, 20).

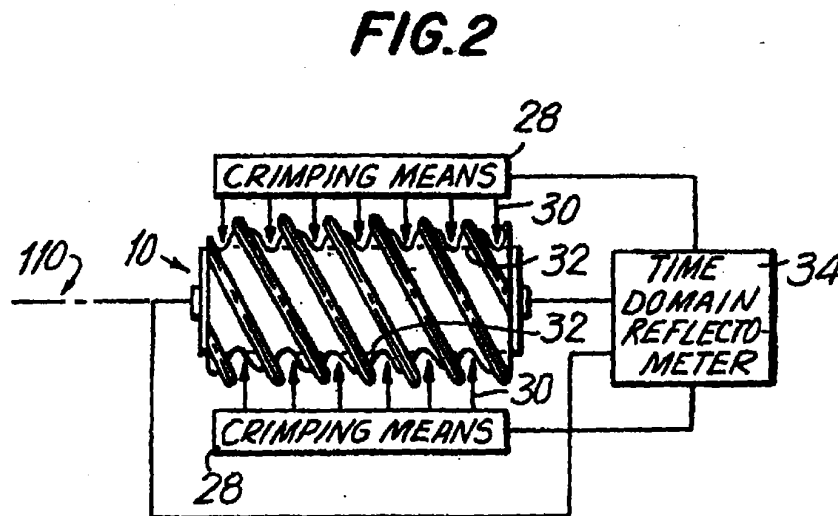
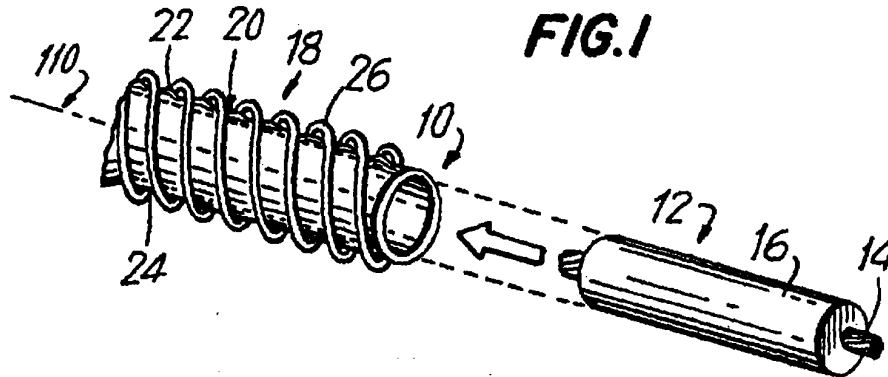


U.S. Patent

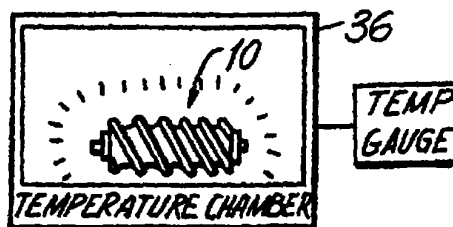
Jan. 26, 1993

Sheet 1 of 5

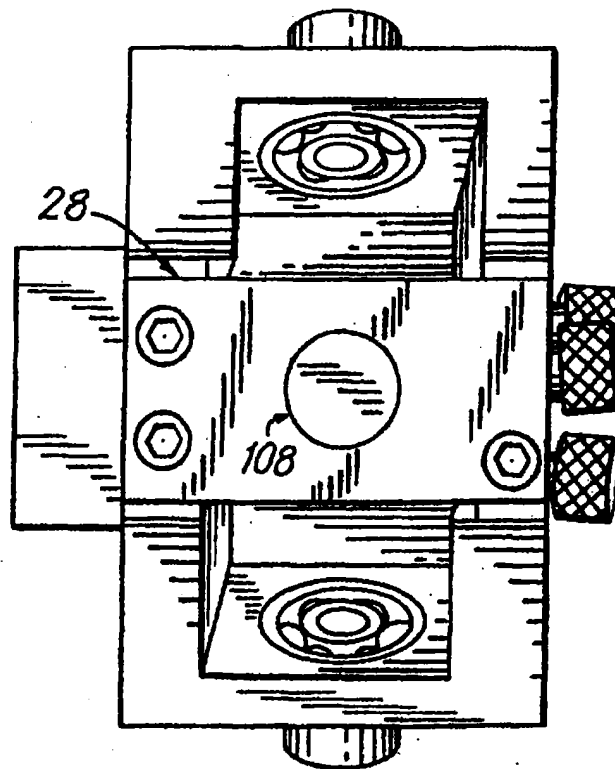
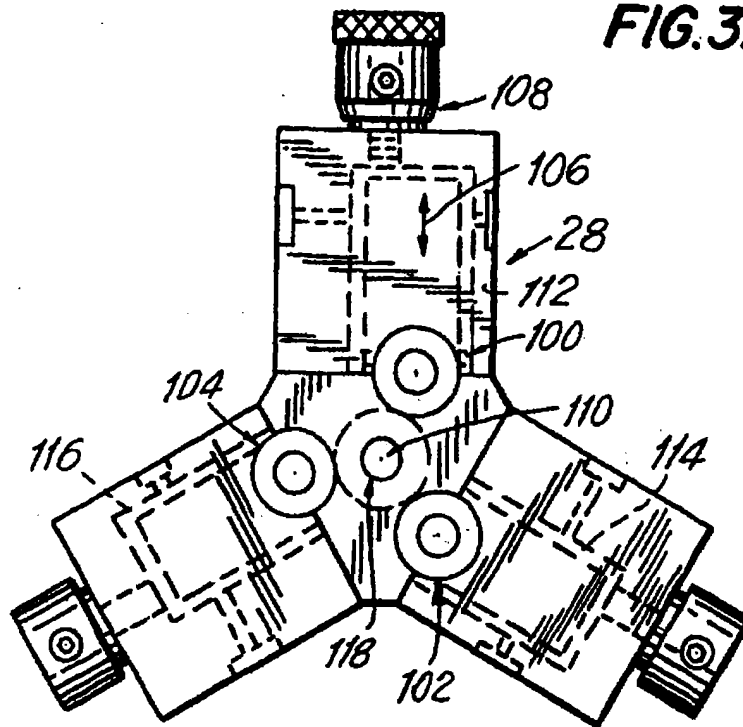
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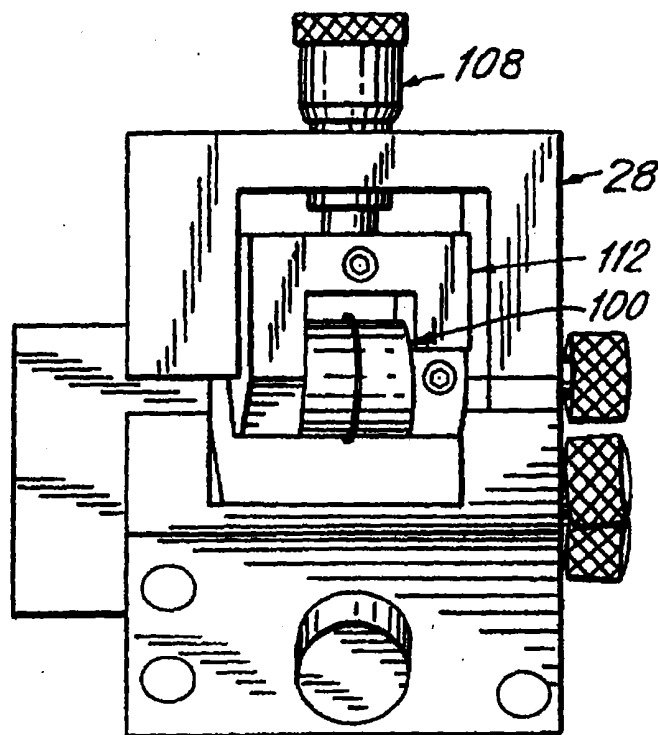
**FIG. 4**



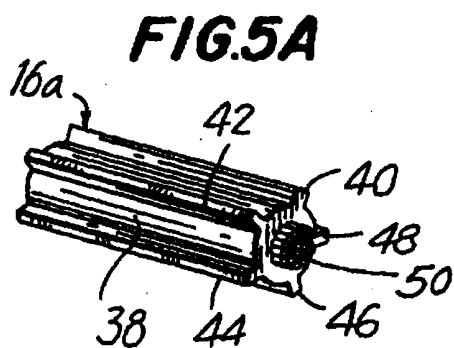
**FIG.3A**



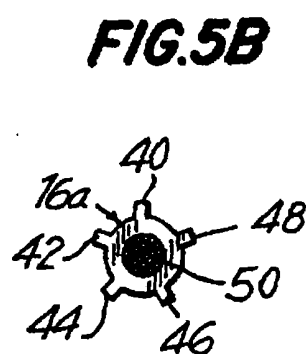
**FIG.3B**



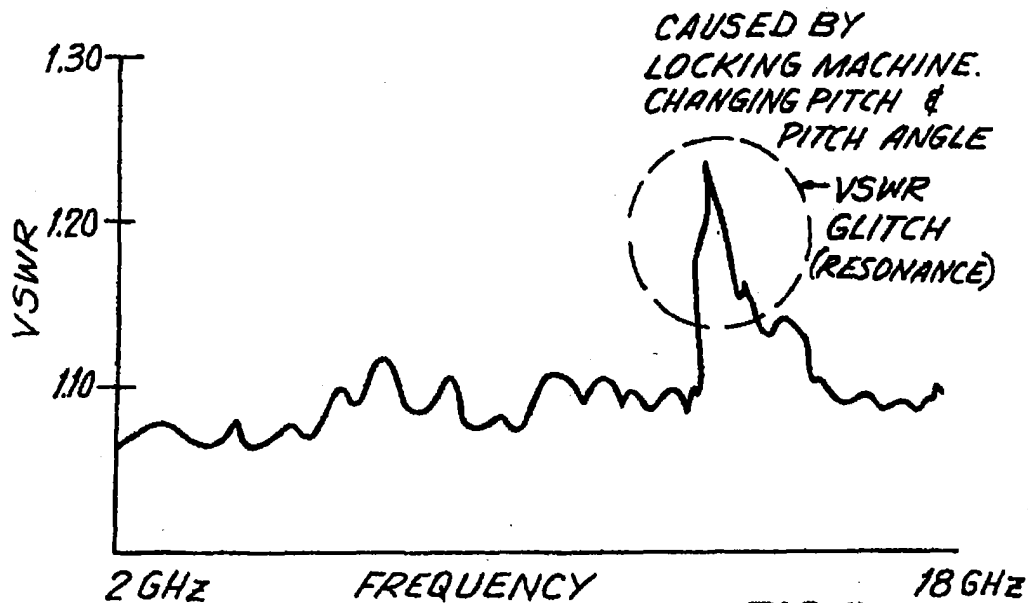
**FIG. 3C**



**FIG. 5A**

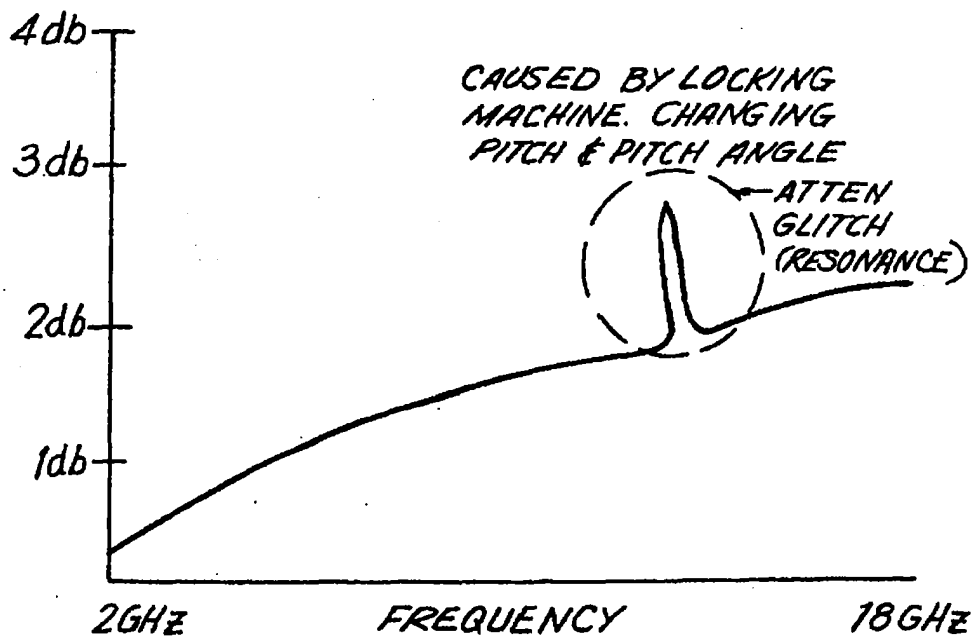


**FIG. 5B**



**FIG.5**

PRIOR ART



**FIG.6**

PRIOR ART





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## METHOD FOR MAKING FLEXIBLE COAXIAL CABLE

### CROSS-REFERENCE TO RELATED APPLICATIONS

This application is related to commonly owned U.S. Pat. Nos. 3,797,104 and 4,758,685, both entitled "Flexible Coaxial Cable and Method of Making Same," naming William Pote as the sole inventor thereof, and is an improvement thereon. The contents of these patents are specifically incorporated by reference herein in their entirety.

### TECHNICAL FIELD

The present invention relates to improvements in the methods of making flexible coaxial cables, and particularly to improvements in locking the outer conductive sheath of such cables to the interior dielectric core.

### BACKGROUND ART

Coaxial cables, such as for microwave transmission have existed in the prior art for a considerable period of time. As technology has developed, a need for flexible coaxial cables whose electrical characteristics do not vary during flexure of the cable, such as in aerospace utilizations, has developed. In such utilizations, often the electrical characteristics of the cable are critical and any variation therein will yield unsatisfactory transmissions via such cables. In order to increase the flexibility of prior art coaxial cables, corrugated outer conductors, such as disclosed in U.S. Pat. Nos. 3,582,536; 3,173,990 and 2,890,263 have been utilized. In addition, other prior art attempts of providing such flexibility a corrugated outer sheath for the cable rather than a corrugated outer conductor, such as disclosed in U.S. Pat. No. 3,002,047. Furthermore, this concept of a corrugated outer sheath has been utilized for standard electrical cables as opposed to coaxial cables, where such cables are exposed to considerable flexure, such as disclosed in U.S. Pat. Nos. 2,348,641 and 2,995,616.

In order to ensure electrical stability for a coaxial cable, the relative location between the various portions of the outer conductor, the dielectric and the inner conductor must remain constant during flexure of the cable or the electrical characteristics may vary. Prior art attempts to ensure this stability have involved the locking of a corrugated outer conductor to the dielectric surrounding the inner conductor, such as disclosed in U.S. Pat. No. 3,173,990 wherein such inner conductor is a foam polyethylene. However, such prior art flexible coaxial cables do not have sufficient flexibility nor do they have sufficient temperature stability, which also affects the electrical characteristics. These prior art coaxial cables utilize either a tube which is crimped to provide a corrugated tube or form- the outer conductor by means of helically winding a piece of conductive material, welding the adjacent pieces together to then form a tube and thereafter crimping alternate longitudinal portions so as to provide a corrugated tube. In both instances, the maximum pitch for the convolutions of the outer conductor is severely limited. In the first instance, this limitation is primarily due to rupture of the conductive tube if the crimps are too closely spaced together whereas, in the second instance, the limitations are primarily due to the inability to sufficiently control the thickness of the resultant tube which is formed as a thin enough material cannot be utilized to produce a

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high pitch. Since the higher the pitch of the convoluted outer conductor, the greater the flexibility of the coaxial cable, these prior art flexible coaxial cables have not been satisfactory where large degrees of flexure are required together with electrical and temperature stability over a wide range of flexure.

Furthermore, these prior art flexible coaxial cable have primarily been of the foam polyethylene or solid dielectric type whereas flexible coaxial cables utilizing spline dielectrics have not exhibited satisfactory electrical and temperature stability characteristics.

These disadvantages of the prior art have been overcome to an extent by the commonly owned prior inventions of U.S. Pat. Nos. 3,797,104 and 4,758,685, which employ mechanical crimping at a given fixed pitch to lock the outer conductive sheath to the dielectric core. However, if the outer conductive sheath does not have a consistent pitch or pitch angle prior to such mechanical crimping, then these slight variations of pitch and pitch angle on the sheath could result in problems of VSWR and attenuation when the resultant cable is used at higher frequencies. These disadvantages of the prior art are overcome by the improved method of the present invention which provides uniform crimping of the sheath to the dielectric core without having to change the pitch or pitch angle if these slight variations are present in the outer sheath prior to such crimping.

### DISCLOSURE OF THE INVENTION

An improved method of making a flexible coaxial cable having a dielectric core comprising an inner conductor and a dielectric surrounding the inner conductor, and a corrugated outer conductive sheath having a plurality of peaks and valleys of predetermined pitch, comprises the step of substantially simultaneously crimping solely the valleys from at least three angularly spaced directions, such as three equiangularly spaced directions, such as substantially 120 degrees apart, about the longitudinal axis of the outer sheath by using angularly spaced crimping wheels which float to follow the predetermined pitch of the corrugated sheath for embedding the valleys in the dielectric so as to lock the dielectric to the sheath for providing electrical stability for the resultant coaxial cable. As a result, the innermost radial extent of the sheath defined by the valleys after crimping is less than the outermost radial extent of the core. The depth of at least one of the crimping wheels may be micrometer adjusted with respect to the sheath longitudinal axis for setting the depth of locking. The other crimping wheels may act as guides in conjunction with a guide slot through which the sheath passes during crimping for controlling the degree of freedom of movement of the crimping wheels and sheath. The characteristic impedance of the coaxial cable may be measured during crimping for stopping the crimping when a predetermined value of characteristic impedance is reached. The crimped cable may be temperature cycled for providing temperature stability in addition to the electrical stability resulting from locking.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1-4 are diagrammatic illustrations of various steps in practicing the improved method of the present invention, with FIGS. 3A-3C illustrating, in various views an improved crimping mechanism for carrying out the improved method of the present invention, and

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with FIGS. 1, 2 and 4 being similar to FIGS. 1-3, respectively, of U.S. Pat. No. 3,797,104;

FIG. 5 is a graphical illustration of the effect on VSWR caused in the prior art by a change in pitch and pitch angle during locking;

FIG. 6 is a graphical illustration, similar to FIG. 5, of the effect on attenuation caused in the prior art by a change in pitch and pitch angle during locking;

FIG. 7 is a cross-sectional view of a flexible coaxial cable produced in accordance with the improved method of the present invention, similar to FIG. 4 of U.S. Pat. No. 3,797,104; and

FIG. 8 is a cross-sectional view, similar to FIG. 7, of a flexible coaxial cable produced in accordance with the improved method of the present invention wherein a spline dielectric is used in place of the solid dielectric of FIG. 7, and is similar to FIG. 5C of U.S. Pat. No. 3,797,104.

### BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to the drawings in detail, and initially to FIGS. 1-4 and 7, the presently preferred improved method of the present invention for making a flexible coaxial cable, generally referred to by the reference numeral 10, shall be described.

Referring now to the drawings in detail and especially to FIGS. 1 through 3A-3C thereof, the preferred method of the present invention for making a flexible coaxial cable, generally referred to by the reference numeral 10, shall be described and, various flexible coaxial cable configurations which may be manufactured in accordance with this preferred method shall be described.

In accomplishing the preferred method of the present invention, a core 12 is initially provided for the coaxial cable. The core 12 is preferably composed of an inner conductor 14 such as a solid copper center conductor illustrated in FIG. 1 or a braided conductor illustrated in FIG. 8, which is surrounded by a dielectric, such as Teflon, high density polyethylene or polyethylene form which is locked to the inner conductor 14 in conventional fashion such as by fusion. The configuration of the dielectric 16 may be foam, solid as illustrated by way of example in FIG. 1, or spline as illustrated in FIG. 8, or any other desired dielectric configuration. For purposes of explanation of the preferred method of the present invention, it shall be assumed that the configuration of the dielectric 16 is a solid dielectric as illustrated in FIG. 1. The core 12 which is readily available, is preferably cut to a length which is slightly longer than the desired end length of the resultant flexible coaxial cable 10. As shown in FIG. 1, an outer conductor 18 is also provided for the flexible coaxial cable 10. The outer conductor 18 preferably is composed of a corrugated main conductive member 20 which has been corrugated to produce peaks 22 and valleys 24 in the conductive member 20 at a predetermined pitch. The corrugated outer conductor 18 may be unnecessarily formed as a single piece or may comprise a helically wound conductive strip 26 preferably composed of the same conductive material as the main conductive member 20 helically wound about the peaks 22 of the corrugated main conductive member 20. If a conductive strip 26 is employed, the conductive strip 26 is preferably secured to these peaks 22 such as by soldering so as to form a single unitary composite conductive member wherein the peaks 22 are accentuated by the helically

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wound strip 26 so, as to increase the flexibility of the outer conductor 18. Such a strip wound outer conductor may preferably be of the type commercially available from Cooperative Industries of Chester, N.J. under the typical designations C8 of such a conductor having a 3/16ths inch nominal electrical outer diameter or H3 for such a conductor have a one quarter inch nominal electrical outer diameter, by way of example and not by way of limitation.

As will be explained in greater detail hereinafter, any desired pitch for the helically wound produced convolutions may be provided, the greater the pitch the greater the flexibility of the resultant flexible coaxial cable 10, the smaller the nominal size outer diameter for the outer conductor the greater the pitch, preferably. This outer conductor 18 is preferably also cut to the same desired length as that of the inner core 12. Most preferably, the initial outer diameter of the inner core 12 is slightly less than the inner diameter of the hollow outer conductor 18. The core 12 is inserted into the outer conductor 18 and aligned end to end. Thereafter, the composite cable containing the slidable inner core 12 and the outer conductor 18 is preferably crimped in the manner illustrated in FIG. 2, by way of example, by denting or crimping solely the valleys 24 existing between the peaks 22 associated with the convolutions of the strip wound conductor 26. Such crimping is preferably accomplished by angularly spaced wheels 100, 102, 104 which ride in the valleys 24, such as wheels which are one third the width of the valley 24, pressure being applied to these wheels so as to uniformly crimp the valleys throughout the longitudinal extent of the outer conductor 18. This is illustrated by crimping means 28 and arrows 30 in FIG. 2, and in more detail in FIG. 3 which shows a preferred crimping means 28 in accordance with the method of the present invention. The crimping is to an outer diameter less than the original outer diameter of the dielectric 16 of the core 12, this original outer diameter being illustrated in FIG. 2 by dotted line 32, so as to lock the dielectric 16 to the other conductor 18.

Preferably, the inner conductor of such a cable 10 is silver plated copper while the outer conductor is preferably a copper alloy.

Typically, by way of example the outer diameter of the dielectric 16 at the crimping points in the valleys 24 is varied between 15 and 20 mils where the core outer diameter is between 120 mils and 122 mils and the outer conductor 18 inner diameter is 125 mils and the outer conductor 18 inner diameter is 125 mils originally, such as for three sixteenths inch nominal outer diameter flexible coaxial cable. The mechanical crimping is preferably accomplished in accordance with the desired characteristic impedance of the resultant coaxial cable. In other words, the outer conductor is crimped, which varies the characteristic impedance of the cable 10, until the desired predetermined characteristic impedance, such as 50 ohms for conventional microwave transmission, is provided for the cable. In order to accomplish this, the characteristic impedance of the cable 10 throughout the crimping step is measured by conventional means such as a time domain reflectometer of the type manufactured by Hewlett Packard under Model No. 1415 and illustrated in FIG. 2 by reference numeral 34. When the desired characteristic impedance appears on the time domain reflectometer 34 then the crimping is stopped either manually or by conventional electrical or mechanical means. The crimped locked coaxial cable

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10 is then preferably placed in a conventional temperature chamber 36 and is temperature cycled in a predetermined temperature range at the extremes thereof such as, by way of example, preferably between 100° centigrade and plus 225° centigrade for Teflon and minus 60° centigrade and plus 80° centigrade for high density polyethylene. Preferably, the cable 10 is cooled at a temperature of minus 100° centigrade (for Teflon) or minus 60° centigrade (for high density polyethylene) for approximately two hours and is then heated at a temperature of plus 225° centigrade (for Teflon) or plus 80° centigrade (for high density polyethylene) for also approximately the same period of time of 2 hours. This provides temperature stability for the coaxial cable 10.

As will be explained in greater detail hereinafter, if desired, such as for a Teflon Dielectric, the crimping step and temperature cycling step may be repeated to increase the mechanical and temperature stability of the resultant coaxial cable 10.

As shown and preferred in FIGS. 3A-3C, one of the angularly spaced wheels 100 is preferably adjustable in depth, in the direction of arrow 106 by means of a conventional micrometer adjustment 108 to move wheel 100 toward and away from the longitudinal axis 110 of the outer conductive sheath 18 so as to set the depth of locking of the sheath 18 to the dielectric core 12 so as to uniformly crimp the valleys 24 at this depth throughout the longitudinal extent of the outer conductor 18. All of the crimping wheels 100, 102, 104 are preferably mounted so as to float to follow the pitch of the outer conductive sheath 18, with such mounts being conventional floating mounts and illustrated in phantom by reference numerals 112, 114, 116, respectively, in FIGS. 3A-3C. As also shown and preferred in FIGS. 3A-3C, the crimping means 28 includes a longitudinal guide slot 118 through which the cable 10 is passed during crimping which controls the degree of freedom of movement of the cable 10 and the wheels 100, 102, 104. The other two crimping wheels 102, 104 preferably act as guides during crimping of the outer conductive sheath 18 to the dielectric core 12. This arrangement preferably enables uniform crimping of the sheath 18 to the core 12 without having to change the pitch or the pitch angle of the sheath, thereby eliminating any glitches in the VSWR or attenuation response at the higher frequencies, such as the glitches of the type illustrated in FIG. 5 for VSWR and in FIG. 6 for attenuation.

Referring now to FIG. 7, a cross sectional view of a typical preferred coaxial cable produced in accordance with the Preferred method of the present invention is shown. By way of example and not limitation, the cable 10 illustrated in FIG. 7 has a solid dielectric 16 and a solid inner conductor 14. As was previously mentioned, the dielectric 16 may be any dielectric material such as Teflon or a polyolefin such as high density polyethylene or polyethylene foam and the inner conductor 14 may be any desired conductor material such as silver plated copper. As illustrated in FIG. 7, the outer conductor 18 is preferably composed of a hollow tubular corrugated main conductive member 20 comprising a plurality of uniformly spaced peaks 22 and valleys 24 having a predetermined pitch and a helically wound conductor strip, preferably composed of the same material as the tubular member 20, and being wound so as to be disposed about the peaks 22 of the corrugated inner member 20 so as to increase the depth of the corrugations. Most preferably, the helical strip 26 is secured to the peaks 22 of the tubular member 20 by conventional

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means such as soldering and is preferably of the conventional type commercially available such as manufactured by Cooperative Industries, of Chester, N.J., under typical designations such as C8 for three sixteenths inch nominal electrical outer diameter and H3 for one quarter inch nominal electrical outer diameter.

As also shown in FIG. 7, the valleys 24 of the outer conductor 18 are embedded into the dielectric 16 which prior to such embedding had a uniform radial dimension about its longitudinal extent, as illustrated in FIG. 1. The embedded valleys 24 lock the dielectric 16 to the outer conductor 18 so that the radial dimensions of the inner and outer conductors 14 and 18 are fixed during flexing of the resultant coaxial cable 10 so that the electrical parameters associated therewith do not vary during such flexure. The outer conductor 18 as well as the strip wound conductor 26 are preferably composed of a conventional conductor material such as copper alloy.

Referring now to FIG. 8, which is similar to FIG. 7, a typical preferred coaxial cable 10a having a core composed of a spline 16a dielectric and a braided inner conductor 50 is shown which coaxial cable 10a has been produced in accordance with the preferred method of the present invention. The outer conductor 18 is preferably identical with that previously described with reference to FIG. 7 and identical reference numerals associated with identical parts previously described with reference to FIG. 7 are utilized in FIG. 8 and will not be described in greater detail hereinafter. Suffice it to say that the primary difference between the coaxial cable 10 illustrated in FIG. 8 and the coaxial cable 10 illustrated in FIG. 7 is that the valleys 24 of the outer conductor are preferably only embedded in the surrounding fins 40 through 48 inclusive of the dielectric 16a, only fin 40 and a portion of fin 44 being visible in the view of FIG. 8. Thus, preferably, the valleys 24 are not embedded in the inner tubular portion 38 of the dielectric 16a of core 12 but rather only in the surrounding fins 40 through 48.

By utilizing the improved method of the present invention, uniform mechanical crimping of the outer conductive sheath to the inner dielectric core may readily occur even though slight variations may be present in the pitch or pitch angle along the outer conductive sheath prior to such crimping thereby improving the response of the resultant flexible coaxial cable at higher frequencies, such as in VSWR and attenuation.

It is to be understood that the above described embodiments of the invention are merely illustrative of the principles thereof and that numerous modifications and embodiments of the invention may be derived within the spirit and scope thereof.

What is claimed is:

1. In a method of making a flexible coaxial cable comprising the steps of providing a core for said cable, said core comprising an inner conductive member and dielectric means surrounding said inner conductive member, said inner conductive member being located substantially along the longitudinal axis of said dielectric means, said dielectric means having an outermost radial extent about said longitudinal axis; and providing a flexible hollow outer conductive sheath of substantially the same extent as said core, said sheath having a longitudinal axis coextensive with said core longitudinal axis and an innermost radial extent about said longitudinal axis which defines the innermost circumference of said hollow within said sheath, said sheath innermost radial extent being initially larger than said core outermost radial extent, said sheath comprising a corrugated



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portion having a plurality of peaks and valleys of predetermined pitch with a conductive portion disposed about said peaks, said valleys defining said sheath innermost radial extent, said peak conductive portion defining the sheath outermost radial extent; the improvement comprising the steps of inserting said core within said sheath until said sheath and said core are substantially coextensive; and substantially simultaneously crimping solely said valleys of said outer conductive sheath corrugated portion from at least three angularly spaced directions about said outer conductive sheath longitudinal axis by using angularly spaced crimping wheels which float to follow said predetermined pitch of said outer conductive sheath corrugated portion for embedding said valleys of said outer conductive sheath corrugated portion in said dielectric means so as to lock said dielectric means to said outer conductive sheath, said sheath innermost radial extent defined by said valleys after said crimping being less than said core outermost radial extent; whereby uniform crimping of said outer conductive sheath is provided for providing electrical stability for said flexible coaxial cable.

2. An improved method in accordance with claim 1 wherein said crimping step further comprises the step of adjusting the depth of at least one of said angularly spaced crimping wheels with respect to said sheath longitudinal axis for setting the depth of said locking of sheath to said dielectric means.

3. An improved method in accordance with claim 2 wherein said adjusting step further comprises the step of micrometer adjusting said depth of said one angularly spaced crimping wheel.

4. An improved method in accordance with claim 3 wherein said crimping step further comprises the step of controlling the degree of freedom of movement of said crimping wheels and said sheath during crimping, said controlling step comprising the step of passing said sheath through a guide slot during said crimping.

5. An improved method in accordance with claim 4 wherein said crimping step further comprises the step of guiding said sheath during crimping with at least a portion of said crimping wheels.

6. An improved method in accordance with claim 5 wherein said method further comprises the step of measuring the characteristic impedance of said coaxial cable during said crimping for stopping said crimping when a predetermined value of said characteristic impedance is reached.

7. An improved method in accordance with claim 6 wherein said method further comprises the step of temperature cycling said crimped coaxial cable between at least a pair of predetermined temperature extremes for a predetermined period of time at each of said extremes;

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whereby temperature stability is provided for said flexible cable.

8. An improved method in accordance with claim 1 wherein said method further comprises the step of measuring the characteristic impedance of said coaxial cable during said crimping for stopping said crimping when a predetermined value of said characteristic impedance is reached.

9. An improved method in accordance with claim 8 wherein said method further comprises the step of temperature cycling said crimped coaxial cable between at least a pair of predetermined temperature extremes for a predetermined period of time at each of said extremes; whereby temperature stability is provided for said flexible cable.

10. An improved method in accordance with claim 1 wherein said method further comprises the step of temperature cycling said crimped coaxial cable between at least a pair of predetermined temperature extremes for a predetermined period of time at each of said extremes; whereby temperature stability is provided for said flexible cable.

11. An improved method in accordance with claim 1 wherein said crimping step further comprises the step of controlling the degree of freedom of movement of said crimping wheels and said sheath during crimping, said controlling step comprising the step of passing said sheath through a guide slot during said crimping.

12. An improved method in accordance with claim 11 wherein said crimping step further comprises the step of guiding said sheath during crimping with at least a portion of said crimping wheels.

13. An improved method in accordance with claim 1 wherein said crimping step further comprises the step of guiding said sheath during crimping with at least a portion of said crimping wheels.

14. An improved method in accordance with claim 2 wherein said crimping step further comprises the step of controlling the degree of freedom of movement of said crimping wheels and said sheath during crimping, said controlling step comprising the step of passing said sheath through a guide slot during said crimping.

15. An improved method in accordance with claim 14 wherein said crimping step further comprises the step of guiding said sheath during crimping with at least a portion of said crimping wheels.

16. An improved method in accordance with claim 2 wherein said crimping step further comprises the step of guiding said sheath during crimping with at least a portion of said crimping wheels.

17. An improved method in accordance with claim 1 wherein said crimping step further comprises the step of crimping solely said valleys of said outer conductive sheath corrugated portion from at least three equiangularly spaced directions.

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